

PATENT ABSTRACTS OF JAPAN

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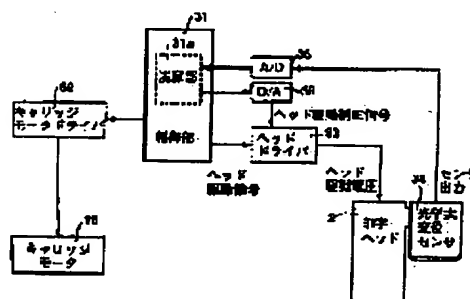
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(54) INK JET PRINTING RECORDING APPARATUS

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent the distortion of a printed character even when a surface to be printed is curved and to perform highly accurate printing by controlling the jet speed of ink by a printing head corresponding to the change of the gap between the printing head and a printing surface even when the gap is changed.

SOLUTION: The gap between a printing head 2 and printing paper is measured by an optical displacement sensor 34 and a control part 31 controls the head driving voltage applied to the printing head 2 corresponding to the measured gap so as to increase the jet speed of ink as the gap becomes large to control the jet speed of ink by the printing head 2. By this constitution, a printed character is not distorted.



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JAPANESE [JP,09-029958,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

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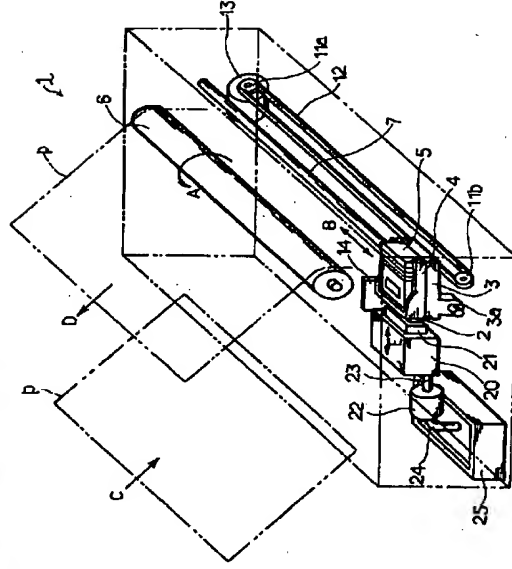
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CLAIMS

[Claim(s)]

- [Claim 1] The ink-jet formula printing recording device equipped with the carriage by which carries the print head and the aforementioned print head of the ink-jet formula which is characterized by providing the following, and which injects and prints ink to a printing hand-ed, and a both-way drive is linearly carried out for printing to a printing hand-ed. A range-measurement means to measure the distance of the aforementioned print head and a printing hand-ed. Control means to which the jet velocity of the ink drop by this print head is changed according to the distance of the print head and the printing hand-ed which were measured by the aforementioned range-measurement means.
- [Claim 2] The aforementioned control means are ink-jet formula printing recording devices according to claim 1 characterized by making jet velocity of an ink drop quick, so that the distance of the aforementioned print head and a printing hand-ed becomes large.
- [Claim 3] The aforementioned range-measurement means is an ink-jet formula printing recording device according to claim 1 characterized by being prepared in the aforementioned carriage.

Drawing selection [drawing 1]



[Translation done.]

JAPANESE [JP,09-029958,A]

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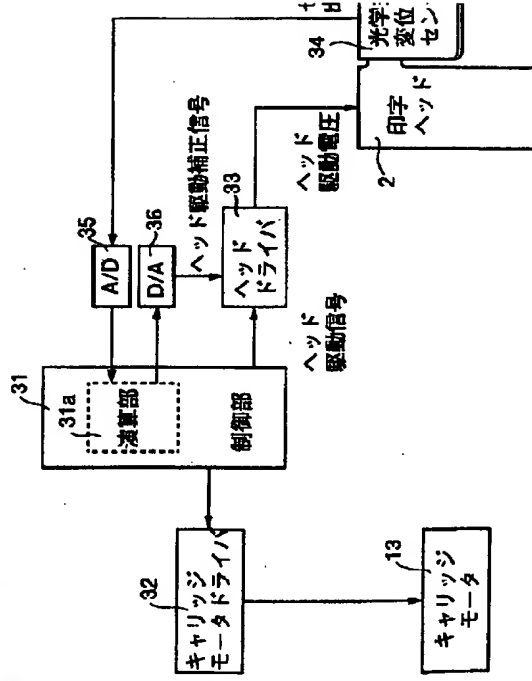
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CLAIMS

[Claim(s)]

- [Claim 1] The ink-jet formula printing recording device equipped with the carriage by which carries the print head and the aforementioned print head of the ink-jet formula which is characterized by providing the following, and which injects and prints ink to a printing hand-ed, and a both-way drive is linearly carried out for printing to a printing hand-ed. A range-measurement means to measure the distance of the aforementioned print head and a printing hand-ed. Control means to which the jet velocity of the ink drop by this print head is changed according to the distance of the print head and the printing hand-ed which were measured by the aforementioned range-measurement means.
- [Claim 2] The aforementioned control means are ink-jet formula printing recording devices according to claim 1 characterized by making jet velocity of an ink drop quick, so that the distance of the aforementioned print head and a printing hand-ed becomes large.
- [Claim 3] The aforementioned range-measurement means is an ink-jet formula printing recording device according to claim 1 characterized by being prepared in the aforementioned carriage.

Drawing selection [drawing 2]



[Translation done.]

JAPANESE [JP,09-029958,A]

Drawing selection | drawing 3

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

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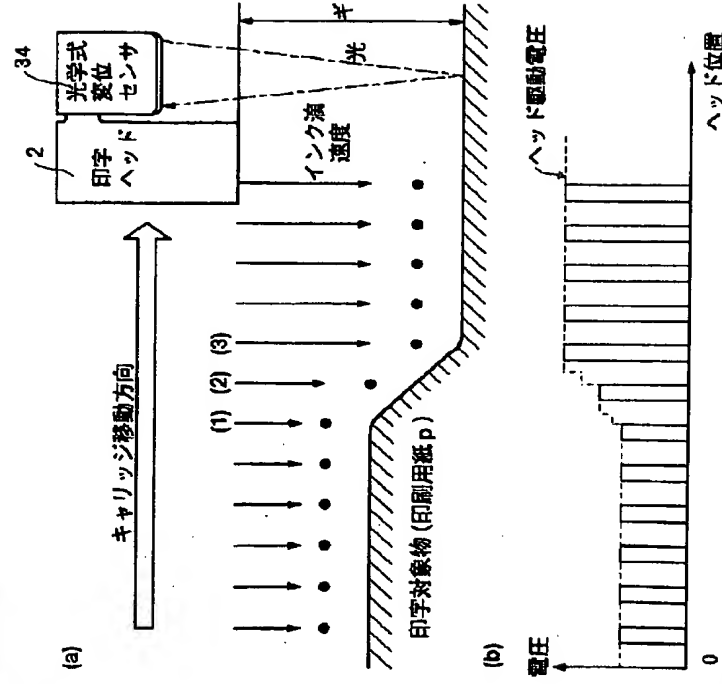
CLAIMS

[Claim(s)]

[Claim 1] The ink-jet formula printing recording device equipped with the carriage by which carries the print head and the aforementioned print head of the ink-jet formula which is characterized by providing the following, and which injects and prints ink to a printing hand-ed, and a both-way drive is linearly carried out for printing to a printing hand-ed. A range-measurement means to measure the distance of the aforementioned print head and a printing hand-ed. Control means to which the jet velocity of the ink drop by this print head is changed according to the distance of the print head and the printing hand-ed which were measured by the aforementioned range-measurement means.

[Claim 2] The aforementioned control means are ink-jet formula printing recording devices according to claim 1 characterized by making jet velocity of an ink drop quick, so that the distance of the aforementioned print head and a printing hand-ed becomes large.

[Claim 3] The aforementioned range-measurement means is an ink-jet formula printing recording device according to claim 1 characterized by being prepared in the aforementioned carriage.



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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective diagram showing the ink jet printer concerning one example of this invention.

[Drawing 2] It is the block diagram showing the outline composition of the printing control system of an ink jet printer.

[Drawing 3] Drawing showing signs that (a) changes the ink drop speed injected from a print head with carriage movement when the height of a printing side differs, and (b) are drawings showing the relation of the head driver voltage to the position of a print head.

[Description of Notations]

1 Ink Jet Printer

2 Print Head

3 Carriage

31 Control Section (Control Means)

31a Operation part

33 Head Driver

34 Optical Displacement Sensor (Range-Measurement Means)

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] Especially this invention relates to the technology of changing the jet velocity of the ink by the print head, about an ink-jet formula printing recording device.

[0002]

[Description of the Prior Art] There is an ink-jet formula printing recording device which prints by injecting ink from the former to a print sheet using the print head of an ink-jet formula.

[0003]

[Problem(s) to be Solved by the Invention] However, in this kind of ink-jet formula printing recording device, in order to perform printing normally, it is made into conditions for a printing object to be a flat surface. It needs that the distance between this, i.e., a print head, and a printing object is fixed, and when this distance changes, a result to which a printing character is distorted is brought. It followed, for example, the seal was stuck on the postcard, and when printing to what is what has a level difference in the printing side, paper, forming plastics with a wrinkling, etc., and has a curved surface in a printing side, the high printing result of precision was not able to be obtained. this invention is made in order to solve the trouble mentioned above, it is controlling the jet velocity of the ink by the print head according to the distance between a print head and a printing side, and even if it is the case where the distance between a print head and a printing side changes, it aims at offering the ink-jet formula printing recording device which can perform high printing of precision.

[0004]

[Means for Solving the Problem] The ink-jet formula printing recording device which starts invention according to claim 1 in order to attain the above-mentioned purpose The print head of the ink-jet formula which injects and prints ink to a printing hand-ed, A range-measurement means to be the ink-jet formula printing recording device equipped with the carriage by which carries a print head and a both-way drive is linearly carried out for printing to a printing hand-ed, and to measure the distance of a print head and a printing hand-ed, It has the control means to which the jet velocity of the ink drop by the print head is changed according to the distance of the print head and the printing hand-ed which were measured by the range-measurement means. In the above-mentioned composition, since control means change the jet velocity of the ink drop by the print head according to the distance between the print head which the range-measurement means measured, and a printing hand-ed, even if there is a printing side portion from which the distance between a print head and a printing hand-ed is changing, since ink adheres without roughness and fineness, distortion of the character printed is lost and high printing of precision can be obtained like other portions.

[0005] Moreover, as for the ink-jet formula printing recording device concerning invention according to claim 2, the distance of a print head and a printing hand-ed makes jet velocity of ink quick, so that control means become large in composition according to claim 1. In the above-mentioned composition, even when the portion which the distance between a print head and a printing hand-ed left exists in a printing side, roughness and fineness can be lost, ink can be made to adhere exactly, and high printing of precision is obtained.

[0006] Moreover, in composition according to claim 1, the range-measurement means is prepared for the ink-jet formula printing recording device concerning invention according to claim 3 in carriage. In the above-mentioned composition, measurement of the distance between a print head and a printing hand-ed is attained, without changing the composition of the equipments concerned other than carriage sharply.

[0007]

[Embodiments of the Invention] Hereafter, one example which materialized this invention is explained with reference to a drawing. Drawing 1 is the perspective diagram showing the ink jet printer 1 concerning this invention. An ink jet printer 1 is equipped with the print head 2 which prints by injecting ink on printing hands-ed (henceforth a print sheet p), such as a print sheet p, and this print head 2 is held at the carriage 3 by which a both-way drive is linearly carried out at the time of printing. The print head 2 is formed in the head unit 4 and one, and the ink cartridge 5 (called an ink tank) which supplies ink to a print head 2 with this head unit 4 is carried in carriage 3 free [attachment and detachment]. A print head 2 consists of a piezoelectric device, and prints by injecting ink using the pumping operation obtained according to the variation rate of the piezoelectric device by voltage impression. Moreover, a print head 2 may be replaced with a piezoelectric device, and may be a thermal head using the thermoelement.

[0008] The front face of a print head 2 is countered, the platen roller 6 is formed in the reciprocation direction free [rotation] in parallel, it has with a print head 2 and a platen roller 6, and the printing section is constituted. Moreover, carriage 3 is connected with the belt 12 which was supported by the carriage shaft 7 more possible [both-way movement] than the direction of arrow B, and was constructed between pulley 11a and 11b through carriage shaft supporter 3a prepared in the lower part of carriage 3, and a straight-line round trip drive is carried out by carrying out the rotation drive of the pulley 11a by the motor 13. By the feed cassette which is not illustrated [which was prepared in the posterior part upper part of an ink jet printer 1], it is fed with a print sheet p in the direction of arrow C, it is carried in in a print head 2 and the direction of arrow A between the platen rollers 6 by which a rotation drive is carried out, and the print sheet p after printing is discharged in the direction of arrow D. In drawing 1, illustration of the feed mechanism of these print sheets p is omitted.

[0009] moreover, the head cleaning which cleans the character head 2 in the side of a platen roller 6 -- the member 14 is formed Furthermore, it counters ahead of the reset state position of a print head 2 in the side of a platen roller 6, and purge equipment 20 is formed. Since the print head 2 of an ink-jet formula may cause poor injection when a foam is generated inside during the use or the drop of ink adheres on an injection side, in order that it may cancel this and may recover a good injection state, it has purge equipment 20. When the print head 2 is covered by the cap 21 who moved in the direction of arrow E and was prepared at the nose of cam, purge equipment 20 generates negative pressure with a pump 22, attracts the poor ink inside a print head 2 with pipes 23 and 24, and a print head 2 is made to recover it. The attracted poor ink is sent to the reservoir section 25.

[0010] Next, the printing control system of an ink jet printer 1 is explained. Drawing 2 is the block diagram showing the outline composition of a printing control system. A printing control system is equipped with the control section 31 which manages control of the ink jet printer 1 whole, and this control section 31 receives print data from an external host computer etc., carries out drive control of the carriage motor driver 32, the head driver 33, and the feed mechanism in which it does not illustrate, and performs predetermined printing operation. The carriage motor driver 32 drives the carriage motor 13, and the head driver 33 controls the injection timing and the injection quantity of ink by the print head 2. Moreover, carriage 3 is equipped with the optical optical displacement sensor 34 which measures the distance between a print head 2 and a print sheet p (gap) in one. This optical displacement sensor 34 irradiates light at a print sheet p, and measures the gap between a print head 2 and a print sheet p based on the quantity of light or the light-receiving position of the reflected light. The optical displacement sensor 34 is formed in the front-face side of the travelling direction of carriage 3, i.e., the travelling direction of a print head 2, and moves with movement of carriage 3. The sensor output (for example, when detecting by the reflected light, the analog voltage proportional to the gap is obtained, if a gap is small, the quantity of light will be large and a sensor output will become large) by the optical displacement sensor 34 is changed into digital value by A/D converter 35, and is inputted into operation part 31a built in the control section 31.

[0011] Operation part 31a has the function which computes the jet velocity of the ink by the print head 2 according to the distance between the print head 2 by the sensor output, and a print sheet p, and the computed data are changed into an analog value by D/A converter 36, and are outputted to the head driver 33 as a head drive amendment signal. The head driver 33 which received this head drive amendment signal will control the head driver voltage outputted to a print head 2.

[0012] Next, operation of the ink jet printer 1 constituted as mentioned above is explained with reference to drawing 2 and drawing 3. Especially, operation in case a print head 2 injects ink to the print sheet p with which the height of a printing side differs is explained here. Drawing 3 (a) is drawing showing signs that the ink drop speed which blows off from a print head 2 with movement of carriage 3 is changed, when the height of the print sheet p which is a printing object differs in the carriage move direction, and the arrow in drawing

shows that speed of an ink drop is made quick, if the length becomes long. Drawing 3 (b) is drawing showing the position of a print head 2, and the relation of head driver voltage. The arrow which shows the ink speed of drawing 3 (a), and the voltage pulse of drawing 3 (b) correspond respectively in each position. When a print head 2 prints to a print sheet p, although ink is injected while a print head 2 moves to the right end section from the left end section of a print sheet p by drawing 3 (a), based on the dot expansion data of the print data outputted from a control section 31, the head driver 33 drives the operation, and injection of ink is performed to predetermined timing. At the time of movement of the carriage 3 accompanying this printing operation, in advance of injection of the ink by the print head 2, the optical displacement sensor 34 measures the gap between a print head 2 and a print sheet p optically, and outputs a sensor output (ranging data) to a control section 31.

[0013] A control section 31 outputs an amendment signal to the head driver 33 so that head driver voltage may be controlled by the function of operation part 31a according to the size of the gap which ranging data show. According [output a head drive amendment signal to the head driver 33 so that operation part 31a may be taken to it if a gap becomes larger than a predetermined value, although it is controlling so that a control section 31 serves as a value predetermined in head driver voltage (pulse voltage) at the head driver 33, when a gap is a predetermined value here, and head driver voltage may become large, and] to print head 2 ink jet velocity is made quick. On the contrary, when a gap becomes smaller than a predetermined value, operation part 31a is outputting a head drive amendment signal to the head driver 33 so that head driver voltage may become small, and makes low ink jet velocity by the print head 2.

[0014] In the transient (1), (2), and (3), corresponding to the change, as the gap of a print head 2 and a print sheet p is the move direction of carriage 3, it is the case where it becomes large, and it is controlled by the example shown in drawing 3 (a) and (b) so that the head driver voltage gradually impressed to a print head 2 becomes large, and thereby, it is controlled by it so that the jet velocity of ink also becomes quick. thus, it is prevented that time even if the gap of a print head 2, a print head 2, and a print sheet p changes by controlling the jet velocity of ink according to the gap of a print head 2 and a print sheet p, after an ink drop is injected until it sits down to a print sheet p serves as about 1 law, therefore the roughness and fineness of distortion or ink arise in printing In addition, by the case where a gap is small, by enlarging voltage pulse width, when driver voltage of a print head 2 is made small, and making voltage pulse width small, when driver voltage of a print head 2 is enlarged by the case where a gap is conversely large, it becomes that from which the size of the ink drop itself does not change, and a desirable result is obtained.

[0015] According to the ink-jet formula printing recording device by this example, the ink jet velocity by the print head 2 is changed by changing the head driver voltage to a print head 2 by ranging the gap between a print head 2 and a print sheet p, and outputting the head drive amendment signal according to this ranging data to the head driver 33 by the optical displacement sensor 34. That is, if a gap becomes small, since it will make ink jet velocity quick if the gap between a print head 2 and a print sheet p becomes large, and ink jet velocity will be made late, even if it is a case as the printing side of a print sheet p is curving, the roughness and fineness of adhesion of the ink on a print sheet p are lost, distortion of a character is also lost, and high-definition printing can be obtained.

[0016] In addition, this invention is not restricted to the above-mentioned example composition, but various deformation is possible for it. For example, although the above-mentioned example showed what formed the optical displacement sensor 34 in the front-face side of the travelling direction of carriage 3, a print head 2 may be approached and you may prepare on the same line as the print head 2 on the field which can relocate in one with a print head 2, and intersects perpendicularly with the travelling direction of a print head 2. Moreover, although the sensor output of the optical displacement sensor 34 was inputted into operation part 31a through A/D converter 35 and was considered as the composition which outputs to the head driver 33 through D/A converter 36 after the operation by operation part 31a in the above-mentioned example, it is good also as composition which feeds back the sensor output from the optical displacement sensor 34 to the direct head driver 33, without being based on this composition.

[0017] In addition, although ink jet velocity is controlled by the above-mentioned example in printing in one line by the print head 2 according to change of the distance between a print sheet p and a print head 2 When ending printing of one line and printing the following line, when the distance between print heads 2 is different from the print sheet p, ink jet velocity according to change of the distance is controlled by the line and the line which printed just before. Moreover, the ink jet velocity by the print head 2 is controllable also by controlling the start of the pulse of the head driver voltage impressed to a print head 2, and falling in **** or the loose state.

[0018]

[Effect of the Invention] Since according to the ink-jet formula printing recording device which starts invention of a claim 1 or a claim 2 as mentioned above the jet velocity of the ink drop from a print head is changed according to change of the distance between a printing hand-ed and a print head, the roughness and fineness of adhesion of ink are lost to a printing hand-ed and distortion of a character is lost even if it is the printing side where the distance between a printing hand-ed and a print head is changing, high-definition printing is obtained. Therefore, when the seal etc. is stuck on the print sheet which is a printing hand-ed, or even when a wrinkle is in a print sheet and it has a level difference in a printing side, high printing of precision can be performed also to the printing hand-ed which has curved surfaces, such as forming plastics. Moreover, since measurement of the distance between a print head and a printing hand-ed is attained according to the ink-jet formula printing recording device concerning invention of a claim 3, without changing the composition of the equipments concerned other than carriage sharply, the cost cut of the equipment concerned can be aimed at. Moreover, since a range-measurement means is prepared in the position close to a print head, the above-mentioned distance can be measured exactly.

[Translation done.]